Interference Communication Monitoring During Frac Operations

With the large number of wells being fractured in the tight sand and shale formations, it has become an increasing concern to operators when adjacent producing wells are knocked “offline” by a nearby frac. In these cases, the fracture fluid is intruding on an adjacent well and “waters out” this adjacent producer artificially. An interference test can be used during the fracture job on candidate wells to see if and when each stage of the fracture is in communication with a neighboring producing well. For this interference test, the introduced transient is the pressure resulting from each fracture stage. These studies will allow operators to better understand the well spacing needed for future drills, the impact of interference and develop a pressure versus distance calculation based on the resultant transient. With this data a more efficient fracture schedule can be put in place for the field. Monitoring this data for several wells in real-time via radio communication, which Halliburton now offers, can also allow for on-the-fly adjustments to current fracturing operations.

This type of test is easily conducted from the surface and in fact gives the exact same information as downhole gauge data would. We recently had the opportunity to perform this exact type of test for an operator who was fracturing a well and wanted to monitor a nearby offset well for interference. The operator used a SPIDR® surface gauge to monitor the offset well. The offset well that was being monitored was shut-in during fracturing operations. The frac job was then carried out on the new well over the next several days, which can be seen in the light blue and is labeled as Well A. The pressure data from the SPIDR® gauge was being streamed in real time to the frac van so that it could be monitored by the engineers on site. The accompanying plots show the surface treating pressure from the frac jobs along with the SPIDR® surface data, shown in black on Well B. The stages from Well A were color coded over the pressure recorded on Well B with the SPIDR® gauge. Color coding the SPIDR pressure for each stage makes it easier to identify which stages might be contributing to the interference.
Figure 1 shows the overall plot with all the frac stages for both wells, the SPIDR® data from Well B, and. The SPIDR® data is overlaid in color according to each stage. There are small pressure increases during most of the early stages. It can be seen that there was significant interference in the offset well (Well B) during stage 19 of Well A which results in a large pressure increase. The interference appears to continue on stages 21 and 22. The final stages from 25 to 36 do not appear to have significant interference as there are no noticeable pressure increases.

Figure 2 shows an expanded view of the interference events from the Well A’s frac operations, with stage 19 being the most significant interference.
Figure 3 shows the final stages 26-36 of Well A’s frac operations. As mentioned above there is no noticeable interference seen on the SPIDR® gauge on Well B during those stages as there are no noticeable pressure increases.
This type of interference monitoring can be done with minimal cost using SPIDR® gauges and provides valuable insight into what is going on between nearby wells during frac operations. Halliburton SPIDR gauges can be connected to Halliburton frac vans using Insite® so that the offset pressure data can be streamed over the internet to computers in your office. Halliburton also offers a radio communication option that can be used to remotely communicate with several SPIDR® gauges within ~1 mile radius and can also be viewed inside the frac van or in your office using Halliburton’s Insite® technology.

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